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Mass Transfer in Heterogeneous Catalysis
by Charles N. Satterfield
This work is a complete revision and extension of *The Role of Diffusion in Catalysis,* by Charles N. Satterfield and Thomas K. Sherwood, published in 1963. The subject has undergone rapid development in recent years and a considerable portion of the contents is based on the results of research investigations and analyses carried out at M.I.T., but the book also contains a detailed and up-to-date bibliography and analysis of studies from many sources. The book represents the refinement of material used in subjects at M.I.T. over the last several years, and in intensive courses and seminars at a variety of universities and industrial organizations.

The general approach is to present subject matter first in clear and qualitative manner in order to establish the concepts and then develop the concepts quantitatively, treating first simple and then more complex situations. The emphasis is on quantitative analysis of practical problems. A large number of illustrative examples are included to this end.

Contents:
Chapter 1 is devoted to ordinary molecular or "bulk diffusion" and to diffusion in pores and includes a brief description of typical porous solid catalysts and methods for their physical characterization. Chapter 2 deals with mass transfer between ambient fluid and porous catalyst, for fixed beds, trickle beds, and for particles suspended in liquid or gas. Chapter 3 describes the theory of simultaneous diffusion and reaction in porous structures and the methods for determining the effectiveness factor of a catalyst. Chapter 4 presents methods of determining the effectiveness factor in more complex situations: those involving temperature gradients inside catalyst pellets, complicated intrinsic kinetic expressions, different catalyst geometries, and volume change upon reaction. Chapter 5 treats the interaction between diffusion and catalyst poisoning and the effects of diffusion on reaction selectivity and on catalyst regeneration.

The Author:
Charles N. Satterfield received the B.S. degree in Chemistry from Harvard and the Sc.D. in Chemical Engineering from M.I.T. He has been a member of the M.I.T. Faculty since 1946, where he is now Professor of Chemical Engineering. He is the author or co-author of over 70 scientific articles and three other books. He has been a member of several government advisory committees and a consultant to many companies in the chemical, pharmaceutical and petroleum industries.
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